TITLE OF THE INVENTION

HERMETIC COMPRESSOR

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application No. 2003-91119, filed December 15, 2003 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates, in general, to hermetic compressors and, more particularly, to a suction muffler of a hermetic compressor, which draws a gas refrigerant of a low pressure passing through an inlet pipe into a compression chamber of a cylinder block.

2. Description of the Related Art

Generally, hermetic compressors are widely used in refrigeration systems, such as a refrigerator, to compress a refrigerant. A conventional hermetic compressor includes a hermetic casing to define a hermetic space, with a compressing unit to compress a refrigerant and a drive unit to drive the

compressing unit being installed in the hermetic casing.

The compressing unit includes a cylinder block which defines a compression chamber to compress the refrigerant. A cylinder head is mounted to an end of the cylinder block, and has both a suction chamber to guide the refrigerant into the compression chamber, and an exhaust chamber to guide the compressed refrigerant from the compression chamber to an outside of the hermetic casing. Further, a piston is installed in the compression chamber.

The drive unit includes a stator which generates an electromagnetic field, when an electric power is applied to the stator. A rotor is rotated by the electromagnetic field generated along the stator, and rotates a rotating shaft. Due to a rotating motion of the rotor, the piston reciprocates in the compression chamber, thus compressing the refrigerant.

Further, an inlet pipe is installed at a predetermined portion of the hermetic casing to draw the refrigerant from the outside of the hermetic casing. A suction muffler is provided at a predetermined portion of the hermetic casing to communicate with the inlet pipe.

The suction muffler functions to reduce noises produced when the refrigerant is compressed by the compressing unit, in addition to guiding the refrigerant into the suction chamber of the cylinder head.

However, the conventional hermetic compressor is

constructed so that the noises are deadened in the resonance chamber provided in the suction muffler. Thus, the conventional hermetic compressor has a problem in that the noises are not completely absorbed in the resonance chamber, but some noises are released to an outside of the compressor through the inlet pipe. Thereby, the flowing direction of the refrigerant is opposite to the releasing direction of the noises in the inlet pipe, thus causing resonance between refrigerant flowing frequency and noise frequency, therefore increasing noises and vibrations of the compressor.

SUMMARY OF THE INVENTION

Accordingly, it is an aspect of the present invention to provide a hermetic compressor which has an improved structure of a suction muffler, thus efficiently reducing noise and vibrations.

Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

The above and/or other aspects are achieved by a hermetic compressor, including a hermetic casing, a compressing unit provided in the hermetic casing to compress a refrigerant, an inlet pipe to guide the refrigerant into the hermetic casing,

and a suction muffler to draw the refrigerant through the inlet pipe and to discharge the refrigerant to the compressing unit. The suction muffler includes a muffler casing, an inlet part, and a refrigerant guide pipe. The muffler casing defines a resonance chamber therein. The inlet part is provided at a predetermined portion of the muffler casing, and has an inlet port to allow the refrigerant to be drawn into the muffler casing, with the inlet port being provided to be spaced apart from the inlet pipe. The refrigerant guide pipe extends from an interior of the resonance chamber to communicate with the compressing unit, with an expanding part having an enlarged diameter and being provided at an inlet of the refrigerant guide pipe.

According to an aspect of the invention, the expanding part may be provided to be tapered in a flowing direction of the refrigerant which is drawn into the muffler casing.

In another aspect of this embodiment, the inlet port may have a shape of a semi-flare pipe which is tapered in a flowing direction of the refrigerant which is drawn into the muffler casing.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of the invention will become apparent and more readily appreciated from the

following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a sectional view of a hermetic compressor, according to an embodiment of the present invention;

FIG. 2 is a sectional view of a suction muffler of the hermetic compressor of FIG. 1; and

FIG. 3 is a perspective view of a refrigerant guide pipe of the suction muffler of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiment is described below in order to explain the present invention by referring to the figures.

FIG. 1 is a sectional view of a hermetic compressor, according to an embodiment of the present invention. Referring to FIG. 1, the hermetic compressor includes a hermetic casing 10, with a compressing unit 20 and a drive unit 30 being installed in the hermetic casing 10. The compressing unit 20 compresses a refrigerant, and the drive unit 30 generates a power to drive the compressing unit 20.

The compressing unit 20 includes a cylinder block 21 to

define a compression chamber 21a therein. A piston 22 is received in the compression chamber 21a, and rectilinearly reciprocates in the compression chamber 21a to draw, compress, and discharge the refrigerant. A cylinder head 23 is mounted to an end of the cylinder block 21, with a suction chamber 23a and an exhaust chamber 23b being defined in the cylinder head 23. Further, a valve plate 24 is interposed between the cylinder block 21 and the cylinder head 23, and includes an inlet valve 24a to allow the refrigerant to be drawn into the compression chamber 21a, and an outlet valve 24b to allow the compressed refrigerant to be discharged from the compression chamber 21a.

The drive unit 30 is provided to reciprocate the piston 22, thus compressing the refrigerant in the compressing unit 20. The drive unit 30 includes a stator 31 which is installed in the hermetic casing 10, and a rotor 32 which is set in the stator 31 to be spaced apart from the stator 31 and is rotated by an electromagnetic field generated along the stator 31 when an electric power is applied to the stator 31. Further, a rotating shaft 33 is provided at a center of the rotor 32 to rotate along with the rotor 32. An eccentric part 34 which eccentrically rotates and a connecting rod 35 are provided under the rotating shaft 33. The connecting rod 35 is connected at a first end thereof to the eccentric part 34 and at a second end thereof to the piston 22, thus converting the

rotating motion of the eccentric part 34 into the rectilinear reciprocating motion of the piston 22.

Further, a suction muffler 50 is provided on a side of the cylinder head 23 to reduce noises produced by compressing the refrigerant in the compression chamber 21a. The suction muffler 50 of the hermetic compressor according to the present invention will be described in the following in detail with reference to FIG. 2.

As shown in FIG. 2, the suction muffler 50 includes a muffler casing 51, an inlet part 53, and an outlet port 55. The muffler casing 51 defines a resonance chamber 52. The inlet part 53 is provided at a predetermined position of a lower portion of the muffler casing 51, and has an inlet port 54 to allow the refrigerant to be drawn into the muffler casing 51. The outlet port 55 is provided on a bottom of the muffler casing 51 to be opened toward the cylinder head 23.

The inlet part 53 has a shape of a semi-flare pipe which is gradually tapered in a flowing direction of the refrigerant which is drawn from the inlet port 54 into the muffler casing 51. The inlet port 54 is provided to be spaced apart, by a predetermined distance, from an end of the inlet pipe 40 which penetrates the hermetic casing 10 to draw the refrigerant into the hermetic casing 10.

Of the refrigerant passing through the inlet pipe 40, a gas refrigerant represented by fine solid arrows flows through

the inlet part 53 into the resonance chamber 52. Meanwhile, a liquid refrigerant represented by thick solid arrows collides against an inclined inner wall of the inlet part 53, and falls to a bottom of the hermetic casing 10 due to gravity. Thus, the liquid refrigerant is not fed through the inlet part 53 to the muffler casing 51. Further, such an inlet part 53 allows noises produced in the compressor to be efficiently reduced. The operational effects of the suction muffler 50 having the inlet part 53 constructed as described above will be described hereinafter in detail.

According to the present invention, the suction muffler 50 further includes a refrigerant guide pipe 56 to guide the refrigerant from the resonance chamber 52 to the cylinder head 23.

The refrigerant guide pipe 56 extends from an interior of the resonance chamber 52 to the outlet port 55. In this case, an end of the refrigerant guide pipe 56 is connected to the cylinder head 23.

As shown in FIG. 3, the refrigerant guide pipe 56 has, at an inlet thereof through which the refrigerant is drawn, an expanding part 57. The expanding part 57 has an enlarged diameter, and is provided to be gradually tapered in a flowing direction of the refrigerant which is drawn into the muffler casing 51.

The operation and operational effects of the hermetic

compressor constructed as described above will be described in the following.

When an electric power is applied to the drive unit 30, the rotating shaft 33 is rotated along with the rotor 32. By the rotation of the rotating shaft 33, the eccentric part 34 is eccentrically rotated. Further, when the piston 22 reciprocates in the compression chamber 21a by the rotating motion of the eccentric part 34, the refrigerant sequentially passes through the suction muffler 50 and the suction chamber 23a of the cylinder head 23. Subsequently, the refrigerant is fed into the compression chamber 21a to be compressed. The compressed refrigerant is discharged to the exhaust chamber 23b of the cylinder head 23.

At this time, the noises produced by compressing the refrigerant in the compression chamber 21a are sent from the suction chamber 23a of the cylinder head 23 to the suction muffler 50, as shown by dotted lines of FIG. 2. The noises are sent through the refrigerant guide pipe 56 of the suction muffler 50 to the interior of the resonance chamber 52.

Further, the noises are diffused into the resonance chamber 52 via the expanding part 57 of the refrigerant guide pipe 56, so that the noises are primarily reduced. Remaining noises are diffused into the compressor through the inlet part 53 having the shape of the semi-flare pipe, so that the noises are secondarily reduced.

In a brief description, the suction muffler 50 according to the present invention is constructed to allow the noises to be doubly diffused, thus efficiently reducing the noises.

Further, the inlet port 54 is spaced apart from the inlet pipe 40, so that the noises passing through the inlet port 54 are not sent to an interior of the inlet pipe 40, but is diffused into the compressor, thus preventing the noise and vibrations from being generated by the resonance between a flowing frequency of the refrigerant and a noise frequency in the inlet pipe 40.

As is apparent from the above description, the present invention provides a hermetic compressor, which is constructed so that a suction muffler includes an expanding part and an inlet part having a shape of a semi-flare pipe, thus efficiently reducing noises produced in a compressing unit, therefore allowing the compressor to be stably operated.

Further, in the hermetic compressor of the present invention, an inlet port of the suction muffler is spaced apart from an inlet pipe, thus preventing noises passing through the inlet port from resonating in the inlet pipe, therefore increasing reliability of the compressor.

Although an embodiment of the present invention has been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the

invention, the scope of which is defined in the claims and their equivalents.